PATENT SPECIFICATION

709,382

Date of Application and filing Complete Specification: April 28, 1952. No. 10638/52.

Application made in Germany on April 28, 1951.

Complete Specification Published: May 19, 1954.

Index at acceptance:—Class 39(1), D4a(4:7), D4K4, D10(A2:B2).

COMPLETE SPECIFICATION

Improvements relating to means for Deflecting the Ray of a Cathode-Ray Tube

We, TELEFUNKEN GESELLSCHAFT FUR DRAHTLOSE TELEGRAPHIE m.b.H., of Mehringdam 32-34, Berlin SW.61, Western Germany, a Company organised under the Laws of Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a magnetic deflecting system for deflecting the electron beam of a cathode ray tube.

A known system of this kind comprises a system of coils, adapted to be fed with current of sawtooth wave form, disposed round the neck of the tube so that active conductors of the coils which set up the deflecting magnetic field, are situated longitudinally of the tube and are joined by transverse conductors round which components of the magnetic field are also formed.

A known deflecting system for the cathode ray tube of a television receiver is provided with two such systems of coils, perpendicular to one another, one system causing line deflection of the electron beam and the other the considerably slower frame deflection of the beam.

When a deflecting system of this kind is arranged to set up a homogeneous deflecting magnetic field it is usually found that astigmatism of the beam occurs, i.e., the beam forms a short line of light instead of a circle or spot of light on the screen of the tube. It has been proposed to overcome this difficulty by arranging the deflecting system so that it sets up a non-homogeneous magnetic field in which the field strength in the direction of deflection of the beam increases towards the outside of the field. This method of correcting for astigmatism, however, introduces a further difficulty in that the area scanned by the electron beam tends to be distorted by a deflecting field of this kind so that it is shaped like a pin-cushion instead of being rectangular.

This difficulty of deflecting the electron beam so as to avoid both pin-cushion distortion of the area scanned and astigmatism of the beam increases with the angle of deflection of the beam and is found to be particularly serious in the case of relatively short cathode ray tubes with a beam deflection angle of the order of 35° on each side of the centre line of the beam, such as are required for modern television receivers. A compromise is thus sometimes found to be necessary. In some cases it may be desirable to tolerate pin-cushion distortion of the area scanned in order that astigmatism of the beam can be substantially eliminated; while in others the reverse may be the case and appreciable astigmatism may have to be tolerated in order that the beam can be arranged to scan a rectangular area. Usually, an intermediate course will be found to be most useful in which only partial correction for astigmatism is accepted in order that pin-cushion distortion can be contained within limits that are tolerable.

An object of the present invention is to provide a deflecting coil system for a cathode ray tube with means which modify the deflecting magnetic field set up by the system so as to vary the shape of the area scanned by the beam.

According to the invention there is provided a magnetic deflecting system, for deflecting the electron beam of a cathode ray tube in two co-ordinate directions, comprising two pairs of coils, one pair being adapted to deflect the beam in one of said directions and the other pair in the other of said directions, the coils in said pairs having active conductors disposed substantially parallel to to the axis of said system and joined by conductors lying transversely of said axis and said coils being arranged so that the active conductors of one pair lie between the active conductors of the other pair of coils,

[Price 2/8]

London: 3s. 6d.

wherein discret members of magnetic material are disposed adjacent to said transverse conductors in positions such that they modify the magnetic deflecting flux set up by said coils in the space swept by the electron beam so as to reduce astigmatism or reduce pin-cushion distortion or so as to obtain a desired balance between said two forms of distortion.

Preferably the discrete members, which may comprise small iron plates, are disposed at the front end of the deflecting system, i.e., at the end facing the screen of the cathode ray tube. They are more effective at this end of the system because the electron beam deflects about a point inside the system and undergoes lateral movements at this end of the system which cause it to move into proximity to the correcting plates during the instants of deflection. Preferably the discrete members are constructed so as to avoid eddy-current losses therein and they may be formed of iron laminations, of wires placed one alongside the other, of powdered iron, or of a ferro-magnetic material of small conductivity, such for example, as a ferrite. Each member may be arranged so that it is independently adjustable to different positions and can be used to modify one particular section of the deflecting magnetic field.

In order that the said invention may be clearly understood and readily carried into effect, it will now be more fully described with reference to the accompanying drawings, in which:—

Fig. 1 shows diagrammatically a side view of a portion of a cathode ray tube carrying a magnetic deflecting system according to the invention, and

Fig. 2 shows diagrammatically in cross-section a back view of the arrangement shown in Fig. 1.

A part of a cathode ray tube is shown comprising a neck portion 1 and a bulb 2 and a magnetic deflecting system comprising pairs of line and frame deflecting coils is shown mounted on the neck 1 of the tube. The line deflection coils comprise active conductors 3, 5 and 4, 6 which are disposed substantially parallel to the axis of the system and joined by conductors 11 and 12, respectively, which lie transversely of said axis. The frame deflecting coils comprise active conductors 7, 9 and 8, 10 which are disposed substantially parallel to the axis of the system and joined by conductors 13, and 14, respectively, which lie transversely of said axis. The active conductors 3, 4 and 5, 6 of the line deflection coils lie between the active conductors 7, 9 and 8, 10 respectively.

It will be understood that when the cathode ray tube is energised an electron beam will be projected along the common axis of the tube and the magnetic deflecting system onto a fluorescent screen (not shown) at the wide end of the tube and this beam will be deflected by the deflecting magnetic fields formed in the neck 1 of the tube, when suitable electric currents of sawtooth waveform are fed to the line and frame deflecting coils of the deflecting system, so that the electron beam scans a substantially rectangular area on the screen having diagonals which coincide with the chain lines 19 and 20 shown in Fig. 2.

According to the present invention discrete ferro-magnetic members 15, 16, 17 and 18 are mounted in any suitable manner (not shown) so that they are disposed adjacent transverse conductor sections 11, 12, 13, 14 in positions substantially corresponding to the corners of the scanned area. These members comprise iron plates which, as shown in the Figs. are disposed so that they lie between the transverse conductor sections 11, 12, 13, 14 and the space within the tube that is swept by the electron beam. Members 15, 16, 17 and 18 modify the magnetic deflecting field in the space swept by the electron beam and may be disposed in positions such that the modified field corrects for pin-cushion distortion or for astigmatism or produces a desired balance between these two forms of distortion.

Each of the plates 15, 16, 17, 18 is arranged to modify the field corresponding to one corner of the area scanned and, preferably, each plate is adjustably mounted so that its position can be re-adjusted when required.

What we claim is:—

1. A magnetic deflecting system, for deflecting the electron beam of a cathode ray tube in two co-ordinate directions, comprising two pairs of coils, one pair being adapted to deflect the beam in one of said directions and the other pair in the other of said directions, the coils in said pairs having active conductors disposed substantially parallel to the axis of said system and joined by conductors lying transversely of said axis and said coils being arranged so that the active conductors of one pair lie between the active conductors of the other pair of coils, wherein discrete members of magnetic material are disposed adjacent to said transverse conductors in positions such that they modify the magnetic deflecting flux set up by said coils in the space swept by the electron beam so as to reduce astigmatism or reduce pin-cushion distortion or so as to obtain a desired balance between said two forms of distortion.

2. A magnetic deflecting system according to Claim 1 wherein said discrete members are disposed in positions substantially corresponding to the corners of the area scanned by the electron beam of the cathode ray tube and so that they lie between said transverse conductor sections and the space swept

by the electron beam of the tube.

3. A magnetic deflecting system according to Claim 1 or 2 wherein said discrete members are arranged so that they can be adjusted to different positions.

4. A magnetic deflecting system according to Claim 1, 2 or 3, wherein said discrete members are constructed so as to avoid eddy-current losses therein.

5. A magnetic deflecting system substantially as described with reference to the accompanying drawings.

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Printed for Her Majesty's Stationery Office by Wickes & Andrews, Ltd., E.C.4. 39/244.—1954.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

709,382 COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

powdered iron Ferro-magnetic member

plate plate plate

plates

FIG.1.

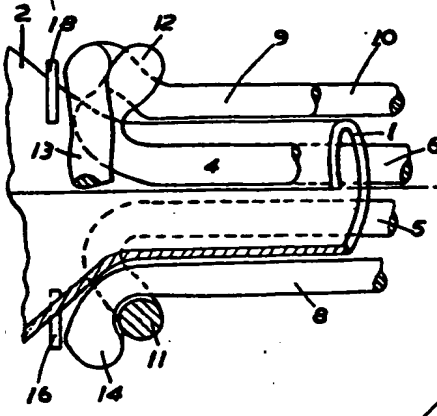
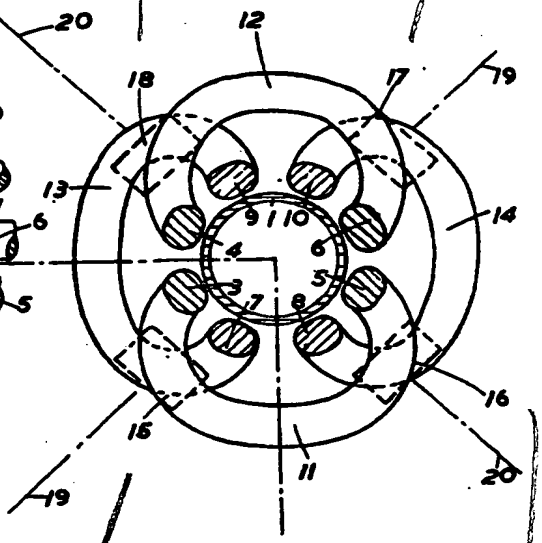


FIG.2.



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